

CLAIMS

1. Method of operating a compression ignition engine  
5 on a fuel consisting of an alcohol and/or ether with water,  
by injecting the fuel into the combustion chamber of the  
engine and combusting the fuel with air, wherein the air  
for combustion of the fuel is preheated to a temperature of  
at least 60°C.

10 2. An oxygenated diesel fuel composition sustainable  
for use in compression ignition internal combustion en-  
gines, comprising methanol, dimethylether and water, where  
the conversion of methanol is 50-95% and wherein the mole  
15 ratio between dimethylether and water is 1; this fuel com-  
position is generated on board a vehicle by catalytic dehy-  
dration of methanol according to Fig. 2; the generated fuel  
composition is used as main fuel for the engine and are in-  
jected into a prechamber or directly into the cylinder(s)  
20 of the engine; the dehydration temperature is between 200°C  
and 450°C; the dehydrogenation pressure is from 10 to 400  
bar; the dehydrogenation catalyst is heated by heat ex-  
change with the exhaust gas. Inlet air to the engine is  
heated to between 60°C and 200°C, preferably between 100°C  
25 and 150°C by heat exchange with the exhaust gas.

3. A fuel composition according to claim 2, wherein  
the methanol used for dehydration contains from 0 to 20  
w/w% of water, and, consequently, results in a dehydroge-  
30 nated fuel composition where added water displaces the ra-  
tio between dimethylether and water generated from the  
methanol dehydrogenation and to the amount of water added.

4. A fuel composition according to claim 2, wherein the methanol used for dehydrogenation contains from 0 to 20 w/w% of ethanol or higher alcohol, and, consequently, displaces the amount of added higher alcohol with the resulting ethers, unconverted alcohol and CO-generated water by the dehydrogenation.

5. A fuel composition according to claim 2, where methanol used for dehydration contains water according to claim 3 and ethanol plus higher alcohol according to claim 4.

6. Use of neat of crude methanol according to anyone of claim 1 to 5, but utilised in ships, trains or in stationary diesel engines for power and heat supply.

International Patent Application No. PCT/EP00/05275  
Haldor Topsøe A/S  
PCT 1182-00957  
May 18, 2001

**NEW CLAIMS 1 TO 5**

1. A process of preparing an oxygenated diesel fuel composition sustainable for use in compression ignition internal combustion engines, comprising methanol, dimethyl ether and water, comprising the step of converting methanol containing up to 20% w/w of water and up to 20% w/w of ethanol or higher alcohol in a catalytic dehydration reaction, the methanol being converted to dimethyl ether according to the reaction scheme:  
$$2 \text{CH}_3\text{OH} \rightleftharpoons \text{DME} + \text{water},$$
using a catalytic converter on board of a vehicle, wherein the dehydration temperature is between 200°C and 450°C and wherein the pressure is between 10 and 400 bar.
2. A method of operating a compression ignition engine on a fuel obtainable by the process of claim 1, by injecting the fuel into the combustion chamber of the engine and combusting the fuel with air, wherein the concentration of methanol is between 5 and 50% w/w and wherein the air for combustion is preheated to a temperature of at least 60°C.
3. The method of claim 2, wherein the combustion air is preheated to a temperature of at least 100°C.
4. The method of claim 2, wherein the combustion air is preheated by exchange with the exhaust gas.
5. The method of claim 2 applied to vehicles, ships, trains or in stationary diesel engines for power and heat supply.